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The Clinical Analysis of Reproductive Failure in Cattle *

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The normal pattern of sexual activity in the unmated cow is manifested in a willingness to accept the bull approximately every three weeks. This periodicity of sexual behaviour is determined, as in other species, by cyclic changes in the ovaries which also dominate and control parallel changes in the reproductive tract. It follows that the field worker investigating the problems of reproductive failure must be familiar with the clinical manifestations of these cyclic changes in order that both functional and organic variations from the normal may be appreciated.

In the course of his clinical duties at the Wellcome Veterinary Research Station, the writer has had an opportunity rarely afforded to the practising veterinarian, namely, that of studying these manifestations in both normal breeding animals and in cattle of known low fertility. The purpose of this paper is, first, to present a tentative classification of the physiological variations in reproductive behaviour which may be encountered in cattle, with notes on the clinical differentiation of these variations, their incidence and significance, and second, to record some observations made on the clinical anatomy of the reproductive tract of healthy animals and some of the organic changes encountered in the genitalia of animals which have shown breeding failure. These remarks will relate to observations made on animals maintained at the Wellcome Veterinary Research Station and to animals in herds made available for investigation by the co-operation of several practitioners.

It is felt that some prior knowledge of the animals available for study at the Research Station is essential for a correct interpretation of these remarks. Briefly, the facilities presented consist of a "hospital" comprising animals admitted on the recommendation of veterinary practitioners because of persistent breeding failure, and a herd of pedigree Ayrshire cattle, maintained under normal conditions of management. The observations recorded here cover 44 hospital animals and 45 herd animals and were made during the period April, 1946, to April, 1948. Two bulls were employed by artificial service for stud purposes and their semen used during 1947 for the insemination of 389 cows belonging to members of the Frant-Whiligh Cattle Breeding Society. The percentage of conceptions to first service on outside animals was 67, pregnancy being assumed after three months non-return to service, while the conception rate in the home herd over the two year period was 52 per cent., based on a rectal diagnosis of pregnancy. There is, therefore, some reason to assume that the herd exhibited some degree of breeding inefficiency which may be partly explained by the inclusion of several animals recruited from the hospital after successful treatment for previous infertility. The observations on the "normal" herd animals must therefore be interpreted in the light of these qualifications.

I. Clinical Physiology

CLINICAL CLASSIFICATION OF THE PATTERNS OF REPRODUCTIVE ACTIVITY IN CATTLE

TYPES OF OVARIAN ACTIVITY		ASSOCIATED SEXUAL CYCLE
1. Ovulatory...	(*a*) Delayed ovulation ...	Normal cyclic oestrus
	(*b*) Normal ovulatory cycle	Normal cyclic oestrus Suboestrus (Murray)
	(*c*) Luteal failure... ...	Long dioestrus
	(*d*) Persistent corpus luteum	Anoestrus
2. Anovulatory	(*a*) Cystic follicles ...	Anoestrus Irregular oestrus Persistent oestrus
	(*b*) Non-cystic	Normal cyclic oestrus Irregular oestrus Anoestrus
3. Inactive		Anoestrus (Murray) (Persistent oestrus)

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Set out in the accompanying Table are the outlines of a suggested classification for the physiological variations which may be encountered in the pattern of bovine reproduction. It is probable that there is available no information regarding the reproductive status of the cow, so vital or so exact, as the knowledge that ovulation has taken place. The ease and certainty with which the bovine corpus luteum may be palpated at mid-cycle renders this precise information readily accessible to the competent clinician and for this reason has commended its use in the proposed classification. Using this clinical standard three main groups have been separated and these have then been divided further by more detailed clinical analysis.

1. OVULATORY

All animals included in the group show evidence of ovulatory activity, in the presence of a clinically recognisable corpus luteum.

The group may be subdivided further into four sub-groups:—

(*a*) Animals showing normal ovulatory cycles.

(*b*) Animals showing ovulatory cycles with delay in ovulation.

(*c*) Non-cyclic animals showing persistence of the corpus luteum.

(*d*) Animals showing irregular cycles with ovulation followed by apparent luteal failure.

(*a*) *Animals showing normal ovulatory cycles.*—The group includes the normal animals showing regular recurrent oestrus and also the animal which is experiencing normal ovarian cycles but which fails to show heat, *i.e.*, those animals designated suboestrus under Murray's definition.[1]

Both groups present an identical picture of ovarian activity. The clinical features of the normal cycle have been described by several workers[2, 3, 4], but it is felt that a restatement of their findings with a slight personal orientation will not be out of place as some confusion has been evident in the past with regard to the timing of the events in the cycle.

Oestrus in the cow normally lasts about 14 hours,[5] during which time the most marked clinical feature to be noted on rectal palpation of the genitalia is the increase in uterine tonicity which throws the contours of the cervix and horns into marked prominence. This erectile state is commonly in evidence two to three days before the onset of oestrus and may persist to some degree for as much as five days after oestrus. Palpation of the ovaries at oestrus will usually permit the identification of a maturing follicle as a tensely elastic surface up to 15 mm. diameter which tends to become softer and more fluctuating as ovulation becomes imminent, in this respect resembling the ripe follicle of the mare. In older cows identification of the maturing follicle presents some difficulty but records of examinations made in the herd and hospital show that such identification was confirmed in 65 of 69 cases, by examination for the presence of corpus luteum at mid-cycle, and relating these findings to those made at oestrus.

Ovulation normally takes place 14 hours after the end of heat[6] and the site of the newly ruptured follicle may be detected as a small pit which will admit the tip of the finger. This crater rapidly becomes obliterated, however, and 24 hours later it is usually extremely difficult to determine from which ovary ovulation has occurred. Although some workers claim to be able to recognise the very young corpus luteum, the writer would agree with Murray (*loc. cit.*) that it is not *readily* palpable until the fifth day of dioestrus. It is then raised well above the surface of the ovary with a prominent button or papilla, and a regular, smooth "polished" surface which is very readily differentiated from the firm, unyielding, almost granular surface of the rest of the ovary. The life of the corpus luteum seems to be a matter for some difference of opinion, and the time of its decline has been variously given as the 12th,[7] 14th,[8] 15th,[4] and 17th[2] day post-oestrus and one observer has stated that it is clinically unidentifiable at the 16th to 18th day.[7] Personal observations, however, have shown that clinical regression rarely commences before the 17th day, and that far from being the gradual process suggested by some workers, the decline of the corpus luteum is an abrupt phenomenon which may halve the size of the mature structure in 36 hours. This sudden decline, moreover, is frequently delayed to such an extent that a prominent corpus luteum may exist in the same ovary with a mature follicle at full oestrus, and it is therefore rather surprising to find that at least one able clinician has cited this association as evidence of defective timing in the reproductive cycle.[8]

From what has been said of the difficulty of identifying the young corpus luteum it will be appreciated that an examination for evidence of ovulation must be restricted to that stage in the cycle when the corpus luteum may be recognised with certainty. The 5th to the 17th day post-oestrus is suggested as a suitable time for such examination in animals showing heat. The determination of ovulatory failure or ovarian inactivity demands that two clinical examinations be made with a ten-day interval so that any young corpora lutea not identified at the first examination may be readily recognised.

Those animals designated "suboestrous" by Murray, which differ from the normal animal only in their failure to show heat, are frequently treated in practice by enucleation of the corpus luteum. Hess[2] found that 50 per cent. of treated cows showed heat within three to four days, a further 20 per cent. showed heat between the 4th and 10th days, and 95 per cent. of services permitted at the induced heat were fertile. Day[10] gave the average time for the onset of heat after enucleation of the corpus luteum as 4·2 days. Personal records show that corpora lutea have been expressed from the ovaries of 70 animals in the past two years and oestrus has been observed within two to seven days in 35. The mean interval was 4·0 days. Ten animals became pregnant to service at the induced heat and in four of them ovulation took place from the same ovary as that from which the corpus luteum had been enucleated. Although Laing[11] has shown that incomplete enucleation may prevent ovulation, the low percentage of conceptions recorded in the present series (28·5) probably partially reflects the low fertility of the subjects. It must be stated that enucleation was only recorded as having been carried out when complete removal of the intact corpus luteum was effected without rupture and the possibility of luteal fragments having been left *in situ* is considered to be *nil*. Examinations of the few animals available for autopsy after the operation failed to show any real evidence of incidental trauma. The only noteworthy finding was that of a single delicate fibrous strand running from the site of enucleation to the margin of the ovarian bursa. The fact that normal ovulation was observed in four animals from the same ovary as the dislodged corpus luteum also suggests that the operation can be carried out without even temporary loss of function by the treated organ.

(*b*) *Animals showing ovulatory cycles with delay in ovulation.*—It has been stated that ovulation normally takes place about 14 hours after the end of oestrus or about 28 hours after the commencement of heat. Although delayed ovulation has been cited as a cause of infertility[12, 9], the condition does not appear to have been defined clinically. It may be assumed that the occurrence of ovulation more than 24 hours after the termination of oestrus might be regarded as delayed, but the demonstration of failure to ovulate by this time can be no proof that ovulation will eventually take place. Although Smythe suggests that the manual rupture of an apparently ripe follicle 72 hours after the end of oestrus indicates that ovulation would have been delayed, personal observations have invariably shown that where ovulation has not taken place 48 hours after oestrus, ovulatory failure has always been absolute, when judged on the evidence of the presence of the mid-cycle corpus luteum. The writer would go further and insist that the mere presence of a palpable follicle more than 48 hours post-oestrus can never be evidence of delayed ovulation. Not infrequently more than one follicle approaches maturity at oestrus and a single ovulation may remain unnoticed in the presence of a second palpable follicle. The clinical recognition of delayed ovulation would appear to demand daily palpation of the ovaries and acceptable evidence would only then be provided by the recognition of persistence of a follicle for at least 36 hours, with subsequent positive evidence of its ovulation in the palpability of a distinct crater.

Ovulation was observed by daily rectal palpation in 58 animals in the herd and hospital. No efforts were made to determine the onset or termination of oestrus but ovulation had occurred in 40 (69 per cent.) when examined the day after that on which oestrus was observed and the remaining 18 (31 per cent.) a day later. As ovulation may have occurred any time in the 24 hours between the two examinations, delay in ovulation was not established, but of 23 animals inseminated in the first group 15 conceived (65 per cent.), while of 11 served in the last group only four conceived (36 per cent.).

(*c*) *Non-cyclic animals showing persistence of the corpus luteum.*—Clinically, the recognition of this group would appear to demand evidence of persistence of a functional corpus luteum for at least 30 days. Examinations made at ten-day intervals would certainly serve to eliminate the possibility of confusing the condition with that encountered in the suboestrous group; regression and development of successive corpora lutea would then be evident even if two successive ovulations occurred in the same ovary. Undoubtedly, as has been pointed out,[4] suboestrus has frequently been confused with this condition but there seems now general agreement that a persistent corpus luteum is only observed in association with uterine distension, whether due to a normal pregnancy, the presence of a mummified foetus or pus.[1,13,14] Only one such case has been noted during the past two years. This animal had been under observation and treated for cystic ovaries associated with anoestrus, and ovulation had been induced by the intravenous injection of 1,000 i.u. "Luteinising Hormone." Insemination carried out at the time of the injection was apparently responsible for the appearance of a pyometra which was in evidence a few days later. The corpus luteum resulting from the induced ovulation persisted for 40 days and resisted all efforts at enucleation. Further treatment was not attempted and the animal was slaughtered. The *post-mortem* appearance presented several features of the condition which have been described previously.[14] The corpus luteum could not be enucleated, even after incision of its fibrous tunic, and after bisection the two halves could only be "shelled out" with the greatest difficulty. The endometrium exhibited changes suggestive of a cystic degeneration, with obliteration of the lumen of the left horn by adhesions which did not appear to be of recent origin. It seemed probable that some degree of endometrial degeneration had existed in association with the cystic ovaries, that the introduction of semen into the diseased uterus was followed by the development of the pyometra and that this condition was responsible for the maintenance of the corpus luteum.

(*d*) *Animals showing irregular cycles with ovulation and subsequent luteal failure.*—This group has been included to give recognition to those animals in which ovulation is followed by the formation of clinically atypical corpora lutea. It must be emphasised that the definition of the group is made on a clinical basis and has no established endocrinological foundation.

Smythe[9] has associated the formation of such atypical corpora lutea with a particular type of infertility in Guernsey cattle. Other features encountered were delay in ovulation, ovarian cysts and the exhibition of long inter-oestrous periods. In the writer's opinion, the description given by Smythe is one which applies to a very distinct clinical entity. In one Guernsey herd, of 27 animals examined, cystic corpora lutea were identified in 11, and cystic follicles in four more. During the months of June, July and August, 17 of the animals showed inter-oestrous periods of more than 30 days, three of these were of more than 60 and two of more than 80 days duration.

The characteristic cystic corpus luteum is enlarged up to the size of a golf ball, fluctuates slightly, ruptures readily and often shows no evidence of an ovulation point. That such corpora lutea may be functionally active is apparent from the fact that they have been noted in three pregnant animals and manual rupture of the cystic body did not interrupt the normal course of pregnancy.

2. Anovulatory

This group includes all animals in whose ovaries a corpus luteum cannot be recognised clinically five to 17 days post-oestrus, and anoestrous animals which, when examined at ten-day intervals, show clinical evidence of current follicular development with no evidence of corpus luteum formation.

Two sub-groups may be recognised:—

(*a*) Animals showing cystic follicles.

(*b*) Animals showing ovulatory failure without the formation of cystic follicles.

(*a*) *Animals showing cystic follicles.*—The appearance of the cystic follicle is the most widely recognised evidence of ovulatory failure. Murray's definition of such cystic follicles is admirable except that it implies the ability to recognise a corpus luteum 48 hours old. It is suggested that the definition might be altered to include only follicles 2 cm. or more in diameter palpable between the fifth and 17th day of dioestrus in the absence of a recognisable corpus luteum. This amendment is made simply to bring the definition within the clinical scope of the author who feels that the recognition of a corpus luteum before the fifth day is frequently difficult.

To the clinician speculating on the causes of ovulatory failure, the sustained growth of the cystic follicle would appear to be evidence of adequate pituitary F.S.H. in the absence of the L.H. which is necessary for final maturation of the follicle and ovulation. Further, the frequency with which cystic follicles follow oestrogen administration and herald the complete cessation of ovarian activity, as in the cow implanted with stilboestrol for the induction of lactation, suggests that depression of the pituitary gland of the cow by oestrogenic substances may proceed in two stages. In the first stage luteinising function is lost and in the second stage that of follicle stimulation. Similarly, recovery of the pituitary gland after a period of depression seems to proceed in two stages—thus, after the removal of the stilboestrol tablet, implanted cows show a preliminary phase of ovarian activity during which follicles appear

but fail to ovulate and complete ovulatory activity is only restored some time later.[15] A parallel state of affairs seems to exist in the cow after parturition when the return to full ovulatory activity is frequently preceded by the appearance of cystic follicles.[16] One is tempted to suggest that the *post-partum* anoestrous phase of the cow represents the latent period required by the pituitary gland for its recovery from the depression brought about by the high level of oestrogen prevailing during pregnancy. Observations on the incidence of ovarian cysts in the herd at Frant are of interest. Of 45 animals, cysts have been recognised in 16, in five of which their appearance followed the administration of stilboestrol dipropionate. In 31 animals in which the resumption of ovarian activity following parturition was studied, 14 showed normal ovulation within 40 days after parturition, seven failed to ovulate and showed cystic follicles within the same period and the remaining ten had shown no evidence of a resumption of ovarian activity at the end of the period of observation. One of the seven showing cysts had received 25 mgm. stilboestrol dipropionate in the treatment of a pyometra. Of the total of 16 animals showing ovarian cysts, ten showed normal ovulation after treatment by simple manual rupture.

An examination of the hospital records shows a very high incidence of cystic ovaries. This reflects the interest of the Station in the particular condition rather than the actual incidence of cystic ovaries in the class of animal represented in the hospital. During the two years under review, 44 animals were admitted to the hospital because of breeding failure, of which 16 showed cystic ovaries. Since the publication of preliminary observations on the hormonal treatment of this condition,[17] a further 21 cases have been treated with "Luteinising Hormone." Of the 33 cases treated, ovulation has been observed in 30 cases and 19 (57 per cent.) have become pregnant. In most cases, treatment with the gonadotrophin has been combined with manual rupture, but other workers[18] have found that such treatment is no more effective than hormonal treatment alone. The indications for re-treatment still need clarification. It seems that the restoration of an effective output of progesterone, by the luteinisation of a cyst or the induction of ovulation, is sufficient to restore normal activity and if such is the case, the persistence of some cystic follicles for one or two weeks may not be a sufficient indication for re-treatment. Daily observation of animals under treatment has hown that ovulation may, in fact, be induced in the presence of cystic follicles and their persistence may be disregarded if examination at the tenth day shows the presence of a clinically recognisable corpus luteum. A side-effect of gonadotrophin treatment may be the induction of superovulation. A high incidence of twin ovulations has been reported to mark the resumption of normal ovarian function after cystic activity and a raised incidence of twin births has been recorded following mating within 35 days of the rupture of cystic follicles.[16] There have been suggestions of a similar observation in the present series and it has become the practice for this reason to withhold service from treated animals until the second oestrus.

(*b*) *Animals showing ovulatory failure without the formation of cystic follicles.*—The clinical recognition of this group is based purely on the negative findings in respect of the absence of the corpus luteum. It is possible that ovulatory failure of this type has frequently been overlooked as it can only be established when clinical findings can be definitely related to the stage of the cycle or when opportunities for frequent repeated examinations exist. It seems probable that many cases previously classed as showing delayed ovulation would fall into this group. Of 20 heifers' cycles studied in the herd, five were anovulatory and fell within this category. It is possible that the condition is a physiological one inseparable from adolescence; the existence of such an adolescent infertile phase in cattle has already been suggested by American work recording the recovery of a high proportion of abnormal ova from young heifers slaughtered after service at the first or second heat period.[19]

In addition to the occurrence of ovulatory failure of this type in the cyclic animal, it seems possible that such anovulatory activity, unaccompanied by heat, might be confused with the true anoestrous state as defined by Murray. In fact, such activity has been observed in five heifers which had failed to show oestrus throughout the autumn and winter. It is possible that the ovaries of these animals had been in a completely quiescent state and were examined at a time when ovulatory activity was about to be resumed. Evidence of follicular growth and regression was obtained from three examinations made at ten-day intervals and it was clear that this ovarian activity was anovulatory. It was interesting to note that subsequent ovulation without manifest heat was observed in two of the heifers, while two more, each of which received 500 i.u. "Luteinising Hormone" intravenously, showed heat and ovulation seven days after injection. Failure to show heat at the first ovulatory period characterises the onset of the normal breeding season of the sheep,[20] and it seems possible that unobserved oestrus may mark an analogous phase in the cow Although the problem of distinguishing such anovulatory activity from complete ovarian inactivity may seem academic, it might be of value to the clinician to recognise such cycles as they probably represent a condition much more amenable to treatment than that prevailing in the true anoestrous animal, where refractoriness to gonadotrophic stimulation is notorious.

3. Inactive

The complete absence of any ovarian activity characterises those animals which have been described as in a state of true anoestrus. Clinically, such animals are identified by palpation of the ovaries on at least two occasions, with an interval of about ten days. The ovaries present a rather flattened surface which is firm and smooth or faintly granular to the touch, and there is no evidence of either a corpus luteum or of recognisable follicles. The condition is encountered as a normal post-partum phase in cows and may be frequently met with in heifers in the late winter and early spring when nutritional levels are low.

The condition, as mentioned earlier, may be induced artificially by the prolonged administration of oestrogenic substances which appear to depress pituitary activity and restrict the output of gonadotrophin from the gland. Hignett[12] has suggested that nymphomania may be noted in cattle in the absence of cystic ovaries. It is possible that some source of oestrogen other than the ovary may exist in the body, which would produce this abnormal behaviour and such cases might be expected to proceed further to produce complete ovarian inactivity and true anoestrus.

II. Clinical Anatomy and Pathology

In general, no attempt will be made to discuss the aetiology of the various changes encountered in the reproductive tract of cattle. The essayist's investigations have been directed essentially to the clinical changes produced by genital disease in the individual and he possesses no qualification which might entitle him to discuss the broader more important aspects of reproductive pathology. The only contribution which may be offered as of possible assistance to the practitioner in his approach to the problem, is contained in some observations which have been made on the incidence and significance of some of the features presented to the clinician on the rectal palpation of the genital tract of normal and abnormal animals. The emphasis has been placed upon rectal examination because the danger of transmitting genital disease from cow to cow by hand or instruments, limits the value of vaginal exploration. The clinical features of the normal genital tract will not be described except where the standards of normality appear to justify examination.

1. Vagina and Cervix

Cervicitis.—Rectal examination usually reveals the presence of the cervix as a prominent, firm, roughly cylindrical body lying on the floor of the pelvic cavity in its anterior third. Enlargement of the posterior border due to protrusion of the annular folds frequently gives the organ a bell-shaped outline and the protruding folds can readily be distinguished by palpation. This condition of enlargement with prolapse of the folds, is one which has frequently been described as evidence of cervicitis.[21, 22] Other workers have criticised this view[14] and have suggested that in the absence of congestion, ulceration or granulation, the term is inapplicable. While not denying the validity of this argument, one cannot agree with the contention that such cervical enlargement is no barrier to conception. Examination of the hospital records shows that six animals were admitted for persistent breeding failure which exhibited no other clinically detectable reason for their infertility. No treatment was instituted as it was assumed that intra-uterine insemination would provide the complete answer to what might be a purely mechanical barrier to conception. All six animals conceived after a total of ten inseminations, but in the absence of complete information on the previous number of infertile natural matings, the evidence must remain inconclusive. It should be emphasised that cervical enlargement of a degree sufficient to be designated cervicitis on rectal palpation, probably represents an extremely gross condition not directly comparable with the possibly normal changes described by Wright (*loc. cit.*) who made his observations with the vaginal speculum. It must be stated, however, that in those herds where a high level of infertility has been encountered in animals showing a more or less profuse, purulent vaginal discharge from which *C. pyogenes* could be isolated with regularity, the most prominent focus of infection has been the cervix and this organ has manifested unmistakable inflammatory changes.

Cervical Stricture.—Three animals admitted to the hospital have shown a marked degree of cervical stricture. In two cases in which the passage of the insemination pipette was impossible at oestrus, both animals were shown to be experiencing anovulatory cycles. After restoration of the normal cycle by the induction of ovulation, normal oestrus supervened with cervical dilation, a normal oestrous

flow of mucus was observed for the first time and intra-uterine insemination was readily accomplished.

Cervical Prolapse.—The vulval prolapse of engorged cervical folds was encountered in two old cows in the herd. Amputation of the prolapse was effective in checking further expulsion and one animal subsequently conceived and calved, while the second, which was 12 weeks pregnant at the time of operation, is approaching full term.

2. The Uterus

While there has been some shift of opinion recently[23] on the frequency with which the infertility of cattle can be ascribed to pathological changes in the uterus, it is still fashionable to think of reproductive disorders in terms of metritis and of treatment in terms of uterine irrigation. In the belief that the greatest opportunities for infection of the uterus are presented after parturition, an attempt has been made to follow the normal involutionary processes shown by the recently pregnant uterus. Personal observations have shown that uterine involution has usually proceeded to a point about the seventh day after parturition, when the two horns are easily distinguishable but the ovary on the recently pregnant side is not yet within reach. At the tenth day the actively involuting uterus is reduced to about the dimensions of the 12th week of pregnancy and presents to palpation a distinctly furrowed surface with the corrugations running along the long axis of the uterus; both ovaries are palpable and occasionally traces of the old corpus luteum of pregnancy may be identified. Involution continues and at three to four weeks is complete. These rather general observations are in accord with the more detailed findings of Casida and Venske[24] who have recorded the mean time required for total involution as 26·2 days. When involution is complete the uterine horns are about one to two inches in diameter and their muscular walls possess a distinct tonus which combined with their downward spiral disposition makes palpation beyond the intercornuate ligament difficult.

Chronic endometritis.—The diagnosis of the existence of a mild chronic inflammation of the endometrium without visual access to the cavity of the uterus has so far proved beyond the writer's powers. As a matter of fact, it is believed that those who employ the term endometritis will admit that it is used to describe a clinical condition rather than to specify the pathological nature of the changes which are said to distinguish the condition. If this is so, then it is probably identical with the condition described by Smythe as hyperplasia[8] and here the essayist feels that he is once more on familiar ground. Personal experience has indicated that loss of uterine tonicity has been most marked in animals showing ovulatory failure. In such animals the condition has resembled the hyperplastic state described by Smythe and restoration of the normal cycle has resulted in immediate involution of the uterus. It is probably true that ovulatory failure cannot be so common as to be held responsible for all the endometritis which has been recognised. If, however, it is admitted that endometritis is a clinical term for an unspecified condition and then assumed that it may be the result of physiological rather than of pathological processes, it may be of interest to consider the possible value of established treatment in the light of this concept. Smythe, in fact, has already submitted the point to scrutiny[8] and has suggested that vaginal irritation may achieve all that is accomplished by intra-uterine irrigation and that such effects as may be attributed to the treatment must be regarded as affecting reproductive function rather than aiding the resolution of a pathological process in the genital tract. There does seem to be some suggestive evidence of gonadotrophic effects following intra-uterine irrigation and the fact that these effects have so far been most marked in heifers suggests that rather than being effects of vaginal, cervical, or uterine irritation, they are the result of simple uterine distension.

The induction of oestrus following uterine irrigation has been reported by Hignett[12] and recently the writer has had the opportunity to investigate a similar observation made by Bruford.[25] In this case the information regarding previous oestrous periods was incomplete but the observation was made that of 11 heifers irrigated with Lugol's iodine solution, nine were in oestrus on the seventh day after irrigation and the other two 48 hours later. The herdsman maintained that no such coincidence of oestrous behaviour was evident before irrigation. Clinical examination at ten-day intervals showed that oestrus had been ovulatory and, further, that the succeeding oestrous period was related in time to the "induced heat."

Such observations tend to suggest that uterine irrigation may set up impulses with profound effects on the whole reproductive system. If it can be shown that uterine irrigation possesses such effects and exercises them by virtue of some other action than that of irritation it may be possible to pursue the accepted lines of treatment, while discarding the irritant solutions employed at the moment in favour of some more physiologically balanced solution such as the one recently suggested by Boyland.[26]

Pyometra.—It must be emphasised that the visible evidence of a copious purulent vaginal discharge can never be accepted as evidence of a pyometra. In fact, in the, admittedly, limited experience of the writer, such copious discharges have more often been evidence of a purulent cervicitis. It has also been noted that the classical description "doughy" cannot be applied to all pyometras and the condition may simulate pregnancy very closely.

Treatment for 12 cases of pyometra following incomplete involution of the uterus, has been instituted in the herd at Frant and the results have not suggested that uterine irrigation is necessary for the successful treatment of the condition. Therapy has consisted of the intramuscular administration of stilboestrol dipropionate in doses up to 25 mgm. Repeat dosage has been carried out when necessary, up to four times, and complete uterine resolution has always been obtained. The disadvantages of the method are that this repeated dosage tends to depress ovarian activity and time is lost after uterine resolution has been effected awaiting a return to normal ovulatory activity. It is believed that the treatment of *post-partum* infection of this type, to be successful, demands early intervention, before tubal damage can render the animal completely sterile. The 12 cases treated in two years cover ten animals. Six became pregnant to the first service, two to the second, and two more to the fifth. The two remaining cases, which so far are barren, are both animals treated successfully for pyometra in their previous lactation. Both animals show clinically normal uteri but bursal adhesions have been noted in both.

Local Suppurative Metritis.—Tumour-like masses, the size of a large coconut, have been identified over the body of the uterus of two animals in a herd where insemination was being carried out by the herdsman. The condition was assumed to be due to the abscess formation in the uterine wall following puncture of the uterine mucosa and the deposition beneath it of grossly contaminated semen. Resolution was slow and accompanied by a purulent vaginal discharge but both animals subsequently conceived without treatment of the condition.

Parametritis.—The changes described by Spriggs[13] under this heading have usually been noted as representing the termination of an acute widespread inflammatory process resulting from attempts at the irrigation of pyometras associated with *C. pyogenes* infection. It was frequently difficult in such cases to distinguish more than a huge tumour-like mass with adhesions to the neighbouring viscera and abdominal walls.

Hydrometra.—The term is used to describe a condition encountered in a 12-year-old cow about three months *post-partum*. Distension of the uterus was shown by catheterisation to be due to the presence of about half a gallon of clear, thin, oily fluid. Uterine involution followed drainage of the uterus but, although recurrence has so far not been noted, there is clinical evidence of a progressive atrophy of the left uterine horn.

Early Foetal Death.—Early foetal death in cattle has been demonstrated at autopsy by Laing.[27] There is therefore evidence that a termination of pregnancy may commonly occur at an early stage and remain unobserved.

In the past two years, four animals confirmed as pregnant at about the 42nd day by rectal palpation have subsequently returned to service. In one case rectal diagnosis was made by two independent observers. In a further case pregnancy was confirmed but some atypical feature noted aroused suspicion of impending foetal resorption or abortion, and these fears were confirmed within two weeks, by a return to service. The arresting feature in suspect pregnancies is the absence of elasticity in the distended portion of the pregnant horn. Thinning of the uterine wall is still evident but the impression is gained of a loss of hydraulic pressure due to dispersion of the fluids throughout the whole cavity of the uterus, while the foetal membranes remain palpable. The opportunity to sacrifice such suspects rarely arises but perhaps one day it may be possible to confirm or refute these suggestions. Until then one can only speculate upon the existence of the condition which may be regarded either as a clinical entity or an alibi for mistaken diagnosis.

3. Bursae and Fallopian Tubes

Examination of the ovarian bursae and Fallopian tubes was carried out, using the technique described by Rowson,[28] as a routine measure in all animals entering the hospital.

Bursal Adhesions.—The existence of adhesions in the ovarian bursa was determined in 21 of 46 cattle examined, the condition was bilateral in 14. Six of these 14 animals failed to become pregnant after a total of 37 inseminations. Four became pregnant after a total of seven inseminations and one proved to have been pregnant on admission. Further emphasis is thus given to Rowson's warning that the severity of the condition, rather than its existence, must guide the clinician in forecasting the breeding potential of an animal.

Salpingitis.—Although Rowson points out that a small portion of the Fallopian tube may be palpated in the normal animal, other

clinical observers have regarded the palpable Fallopian tube as evidence of abnormality.[2,8] In a small investigation of this point the writer recently examined ten healthy bulling heifers. Apart from confirming Rowson's statement regarding the palpability of the normal tube, one other interesting observation was made: it was found that, working right-handed, one tended to palpate the uterine end of the left tube and the distal end of the right, so that the left tube gave the impression of a fine wire to the touch, while the right tube was much less conspicuous and more flattened and tape-like. When palpation was directed to comparable portions of the two tubes this asymmetry was not apparent. Undoubtedly in the past, this lack of symmetry has been interpreted, at least by the essayist, as indicative of the existence of pathological changes in one of the two tubes.

In an attempt to determine the existence of pathological changes in tubes which had been readily palpable in life, portions were submitted from seven animals for histological examination. In only three cases were morbid changes apparent and marked changes were observed in only one animal. It was somewhat reassuring to find that this animal had shown a pronounced degree of thickening of the tube in life.

Hydrosalpinx.—Hydrosalpinx is usually readily identified, as distension of the occluded tube with fluid often permits its palpation, even without engaging the ovarian bursa. Two cases have been recognised in hospital cows and later confirmed on *post-mortem* examination. When gross distension is present and adhesions between the tube and the ovary exist, casual examination might lead one to confuse the condition with that of the ordinary cystic ovary. The cystic tube, however, does not possess the same degree of tension as the cystic follicle and the fluid may be driven along the tube by digital compression.

There can be no doubt that the Fallopian tube of the cow is normally palpable in life, but it seems clear that clinical examination can give valuable information on the state of the organs and assist in a prognosis of the animal's future breeding prospects.

Acknowledgments

The author wishes to acknowledge his indebtedness to Mr. S. L. Hignett, B.Sc., M.R.C.V.S., for his personal tuition and his constant interest and encouragement.

Thanks are also due to Dr. D. Trevan, Wellcome Physiological Research Laboratories, Beckenham, for his examinations of histological material.

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MEDICAL RESEARCH COUNCIL

Lord Addison and Sir George Schuster have been appointed members of the Medical Research Council. With the approval of the Committee of Privy Council, the Medical Research Council have appointed Lord Addison to be Chairman in succession to Lord Balfour of Burleigh, and Sir George Schuster to be Treasurer in succession to Sir William Goodenough. The following have also been appointed members of the Council: Sir Frederic Bartlett, Professor of Experimental Psychology, Cambridge, Sir Howard Florey, Professor of Pathology, Oxford, and Mr. Geoffrey Jefferson, Professor of Neurosurgery, Manchester.

CLINICAL COMMUNICATION

Mepacrine Hydrochloride in the Treatment of Bovine Coccidiosis

Summary of a Herd Outbreak and its Treatment

F. ANDREW EDGSON, M.R.C.V.S.

Reading

Mepacrine hydrochloride (2-chloro-5-(δ diethylamino-α-methylbutyramino)-7-methoxyacridine dihydrochloride), a light yellow powder which is soluble in water to about 2 per cent., was introduced in 1930. It has a bitter taste and is slightly acidic in reaction. Mepacrine was used mainly in human infections due to sporozoa, such as in the plasmodia of malaria. For this purpose it found a wide field in the recent Far-East campaigns. It has also been used successfully in infections due to intestinal protozoa, *e.g.*, giardiasis. It was a logical follow-on that it be tried against infections similar to those of the genus Plasmodium, *e.g.*, coccidia. Within recent years favourable reports have been received from the Continent[1, 2, 3, 4] on its use in coccidiosis in animals, both by injection and oral administration.

Subjects.—The affected animals were all members of an attested herd of pedigree Jerseys. The management and standards of hygiene on the farm were of the highest order. No previous cases of coccidiosis had been observed on this farm.

History.—In all, twelve animals showed clinical symptoms of coccidial infection and oöcysts were demonstrated in all the faeces samples taken immediately at onset of symptoms, and prior to treatment.

Course of Outbreak and Symptomatology

The first animal to be seen affected was one of two calves (four months of age), which were housed together. This animal was seen to pass loose motions of a slightly gelatinous nature and flecked with small amounts of blood. A sample of the droppings was collected the same day, coccidiosis being suspected. The animal's appetite was good, and it appeared otherwise normal. The temperature was 102·5° F.

The animal was placed on a light diet and phthalyl-sulphathiazole administered, the symptoms being slightly alleviated. Forty-eight hours later its mate developed similar symptoms, and the tentative diagnosis of coccidial infection being confirmed by faecal examinations, a supply of mepacrine hydrochloride was obtained. Treatment with this was initiated, and by the end of the second day the motions from both animals appeared normal. Three days later two heifers (eight and ten months) were seen to pass faeces containing an abnormal amount of mucus. These motions were over-frequent and small in amount, involving some straining after defaecation. Faeces examinations again proved the presence of coccidia, and mepacrine hydrochloride treatment was begun. Later, other heifers were seen to develop similar symptoms, and in all 12 animals were affected. None exhibited an acute enteritis, probably because of the early initiation of treatment. Animals in contact with those affected were also given a course of mepacrine hydrochloride.

One more case is perhaps worthy of individual mention. The subject of this case, a two-year-old bull, showed symptoms similar to those previously described. By the end of the third day of treatment, however, the amount of blood present in the faeces was appreciable and slightly more than at the commencement of treatment. Apart from this, the animal appeared well. Treatment was continued until the end of the fourth day. By the fifth day blood was still present in similar amounts. Mepacrine administration was stopped and animal was put on to drinks, *t.i.d.*, containing a little gentian and nux vomica, each dose being administered in one to two pints of flour gruel.

A dung sample taken on the fifth day proved negative for coccidial oöcysts. By the end of the sixth day the dung was normal and no further symptoms were seen. A dung sample taken on the twelfth day was again negative to the parasite.

Mode of Infection.—This would appear to have been from a consignment of straw recently imported on to the farm. No in-milk cows were affected in this outbreak, and only animals bedded on this straw were affected. One coccidium was found in the sample examined by the laboratory.

Treatment and Dosage.—Dosage was calculated by approximate body weight. One gramme of mepacrine hydrochloride was administered daily per 200 lb. body weight, this being divided into two doses. Each dose was given in one to two pints of water. (In the case of calves of three to four months the total volume did not exceed half a pint per dose.) The animals were kept on a light diet and the bowels well open—if necessary a small amount of

linseed oil was given at night. This treatment was continued for three days, except in the case of one animal, *i.e.*, the bull.

Summary and Comments

1. Twelve cases of coccidial infection responded well to treatment with mepacrine hydrochloride. Faeces examinations seven days after the last dose of the preparation were negative for oöcysts in all except two cases (ten-month-old heifers). These two received a second course following which negative samples were obtained.

2. Since mepacrine hydrochloride has no intestinal sedative action, supplementary treatment with an intestinal sedative or demulcent is indicated either:—

(*a*) Before mepacrine administration, when there is a very severe enteritis, or

(*b*) After the prescribed course of mepacrine hydrochloride (three to four days) has been given with a continuance of enteric symptoms.

3. Toxicity in recommended dosages appears to be nil. Treatment in lactating cows (not mentioned above) does not involve colouration of the milk.

4. The low cost of treatment compared with the sulphonamide compounds is worthy of comment.

5. An early initiation of treatment would seem to be of great importance, except in specific instances (see para 2, section a).

Acknowledgments.—Mepacrine hydrochloride, in the form of free-flowing granules prepared by May and Baker, Ltd., under the trade name of Mecryl, was used in the cases described, and their advice with regard to this drug has been greatly appreciated. My thanks are due also to Dr. Barron, 7, Redlands Road, Reading, and his laboratory staff, who undertook all the faeces examinations.

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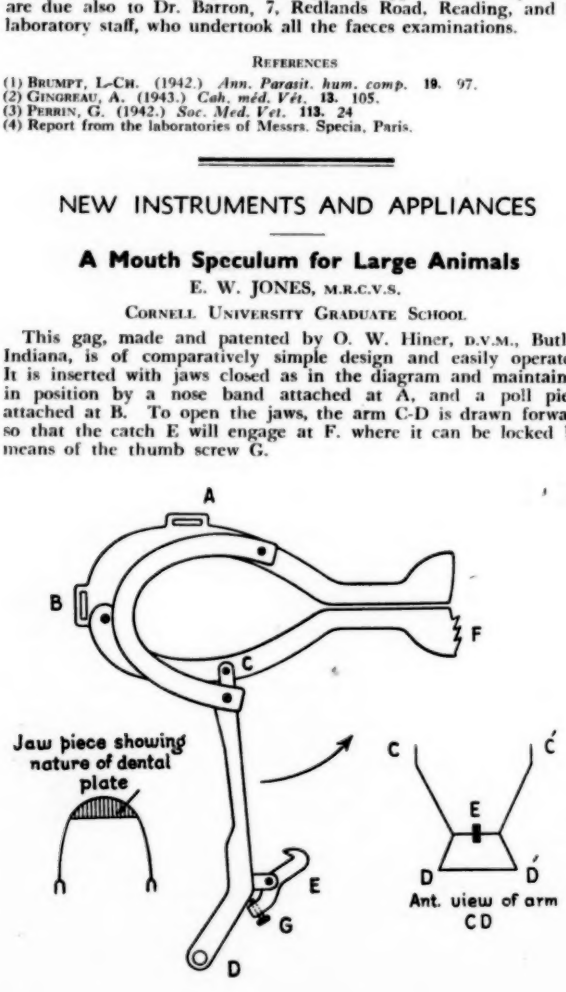
NEW INSTRUMENTS AND APPLIANCES

A Mouth Speculum for Large Animals

E. W. JONES, M.R.C.V.S.

Cornell University Graduate School

This gag, made and patented by O. W. Hiner, D.V.M., Butler, Indiana, is of comparatively simple design and easily operated. It is inserted with jaws closed as in the diagram and maintained in position by a nose band attached at A, and a poll piece attached at B. To open the jaws, the arm C-D is drawn forward so that the catch E will engage at F. where it can be locked by means of the thumb screw G.



Questions and Answers

The submission of questions for inclusion in this column will be welcomed: they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Coccidiosis in Cattle

Q. CCLXVII.—*What is the diagnosis, prognosis and latest treat- for coccidiosis in cattle?*

A.—(1) The clinical picture may be sufficient to arrive at diagnosis but this should be confirmed by microscopical examination of faeces or its examination for coccidia by Sheather's flotation method. Prognosis naturally depends on the age and condition of the animal and the hygienic conditions prevailing. Older animals usually stand the best chance of recovery but to-day with prompt and efficient treatment it should be possible to obtain a high percentage of recovery in all cases.

In terms of modern chemotherapy clinical reports indicate varying success from the use of certain sulphonamide compounds. More recently, however, mepacrine hydrochloride would appear to have superseded sulphonamides not only in therapeutic efficiency but also because of its comparatively low drug cost. Dosage of mepacrine hydrochloride is calculated on the basis of 1 gramme daily for each 200 lb. body weight. The computed dose is dissolved in two pints of water and given as a drench. If possible the dose should be divided into two equal parts and administered morning and evening. According to response treatment is continued from two to four days. A sufficiency of clean drinking water should be at hand and in most cases the faeces are clear of blood after the second day when the feeding of dry hay aids a return to normal faecal consistency. Animals so treated may be allowed to return to pasture after the fourth day.

Mepacrine hydrochloride is freely available in tablet form from a number of manufacturers and a granular form is supplied by May & Baker, Limited.

(2) Coccidiosis in cattle is caused by infection with *Eimeria zurni* which produces symptoms of haemorrhagic enteritis usually indicated in the earlier stages by loose motions with blood or blood clots. Later there may be a passage of thin, blood-stained faeces and in severe cases the admixture of blood may be very pronounced. In the latter two instances tenesmus is often noticed and the sphincter ani may remain patent, in some cases resulting in a frequent voidance of a trickle of blood-stained faeces causing marked soiling of the hind quarters.

In some cases—particularly in the early stages—some inappetence may be noticed accompanied by a high temperature 105° F. or even higher, but many cases show no temperature rise when examined for the first time.

I have met this condition in calves as early as two months of age, but more frequently in heifers and bulls up to two years old, usually housed in yards.

Treatment is designed to prevent re-infection as well as to deal with the immediate infection. The infected animals, even calves, should be tied up so that they cannot contaminate their food or water with their faeces. They should be maintained tied up during the course of the treatment.

The only effective and practical way of disinfecting yards is thorough cleaning with soda water and disinfectant, followed by blow lamping.

In treatment a warm dry bed is provided and the animal rugged if necessary. Where tenesmus is marked the elevation of the hind quarters appears to be useful.

Sulphamethazine in medicinal doses combined with kaolin given at 12 hourly intervals for four days has given extremely satisfactory results in the treatment of bovines of all ages.

. . . . . .

Tuberculin Testing in Pigs

Q. CCLXVIII.—*What is the technique for the tuberculin test in pigs with the present Weybridge tuberculin? On what reactions do you base your interpretation?*

A.—The respondent's experience of the tuberculin testing of pigs is confined to the intradermal method.

Tuberculin is injected intradermally into the loose fold of skin between the upper edge of the ear and the head. Avian tuberculin is injected on one side of the head and mammalian tuberculin on the other. No skin measurements are taken and the skin is examined at the end of 48 hours. The interpretation of the

test is based on the character of the swelling. A diffuse oedematous swelling indicates a positive reaction. In my experience the positive reaction is usually well marked and doubtful reactions seldom occur.

* * * * *

Disinfection of Milking Machines

Q. CCLXIX.—*Is any useful purpose served by dipping milking machines in disinfectant between cows?*

A.—The common practice adopted on dairy farms of plunging clusters momentarily in water containing a chlorine disinfectant probably serves no purpose in preventing the spread of pathogenic udder bacteria. This was shown experimentally by Hay (1941) who demonstrated, in a herd of 65 cows, that rinsing of teat clusters merely removed streptococci during the early stages of milking but as the strength of the disinfectant was reduced the bacterial flora of the clusters was varied and of high count. Although preliminary washing in water reduced the spread of organisms slightly, Hay found that complete sterilisation of the clusters was obtained only by steaming and immersion in chlorine solution between cows.

It may be shown that the bactericidal action of chlorine disinfectants is high *in vitro*, but there is no question that their efficiency is markedly reduced in the presence of milk and it is probable that they have no action on organisms enveloped in any abnormal secretion which may be deposited on teat liners.

Observations have been made on the control of *Str. agalactiae* infection where teat clusters have been subjected to two consecutive immersions in chloros solution (℥ii to one gallon of water) followed by a rinse in water. In one herd where no hand stripping was practised, spread of infection was markedly reduced for three years by this method but following a widespread development of teat sores in the cows, infection again spread rapidly. Thus under these improved conditions of disinfecting clusters, it is probable that the transit of pathogenic organisms is reduced to include minimal numbers which ordinarily are not sufficient to induce udder infection unless there is a predisposing factor such as lesions of the teat surface.

Further improvements towards effective disinfection, such as discarding worn liners and complete avoidance of the drain back of milk from the milking tube, would probably secure sterility of the clusters by chemical agents.

Hay, J. R. (1941.) *Amer. J. vet. Res.* **1-2.** 298

* * * * *

Correspondence

Re *Coprophagy in the Canine*

Sir,—Following the advice of K. G. Morgan, M.R.C.V.S., I have found that this condition (especially in the greyhound) usually responds to administration of an ammonium compound.

It seems immaterial which one is used and presumably the condition in the cases which I have seen has been one of a straightforward ammonium deficiency.

Yours faithfully,

43, St. David's Hill, Exeter. Peter J. Dalton.
October 3rd, 1948.

"STILL A WELCOME FOR A GOOD FARM HORSE"

Mr. G. Oram (who farms Frostenden Hall, Beccles), writes in a recent issue of *The Farmers' Weekly*:—"Mr. A. G. Street surely exaggerated in the issue of September 24th by saying that working horses were 'practically gone' from our farms. He should not forget that he has a large public, some of it not too conversant with our industry, and a misleading impression might be created in that section by this statement.

"I don't want to stir up the old argument of horse versus tractor, but I am certain that there is still and will be for a long time to come, a welcome place on most farms for a good horse or two. We know that tractors have largely replaced them for such jobs as ploughing, but there are still plenty of tasks a horse can do better and cheaper than a tractor. Arable Wiltshire may be able to do without horses, but in hilly and heavy land districts conditions are different. There are plenty around these parts."

* * * * *

Weekly Wisdom

There is no more dangerous illusion than to think that a large unit is necessarily more efficient than a small one.—The Times.

ABSTRACT

[Lyophilized (Desiccated) *Brucella abortus* Vaccine (Strain 19). Scheidy, S. F. *N. Amer. Vet.* **28.** 12. 812-816.]

A brief review of the methods of vaccination which have been used for the control of Brucellosis in cattle is followed by special reference to Strain 19 and an account of the deterioration of this vaccine under adverse conditions and on storage. The need for a more stable form of *Brucella abortus* vaccine was realised, and such a product has been prepared by means of a "freeze-drying" or lyophilization technique.

Desiccation by lyophilization of the liquid vaccine (a saline suspension of organisms) was unsatisfactory, but the technique was quite suitable when the organisms were suspended in skimmed milk and phosphate buffer solution. A note on the principles of lyophilization and an account of the technique as applied to *Br. abortus* vaccine are given. The final product is supplied in dry form in 10 c.c. vials; each vial is accompanied by a vial of sterile distilled water and reconstitution is readily effected by suspending the lyophilized vaccine in this diluent. Details are given of the tests used for estimating the keeping qualities of the product, which remained stable at refrigerator and room temperature for at least three years and withstood exposure to a temperature of 122° F. for two days with only a slight loss of viability. The author considers that the stability of lyophilized vaccine under a variety of adverse conditions justifies the labour and expense involved in its production.

The vaccine was released for distribution by the United States Bureau of Animal Industry about two and a half years ago and has since been used extensively.

C. A. E. B.

REPORT

[Southern Rhodesia. Report of the Chief Veterinary Surgeon, Mr. T. D. Huston, M.R.C.V.S., for the year 1947].

The report mentions that for the greater part of the year only ten executive professional officers were employed, and of these three were engaged on meat inspection, leaving only seven for district work. Animal Health Inspectors numbered 65 at the end of the year.

One outbreak of foot-and-mouth disease occurred during the year, and became widespread owing to the movement of cattle. The area was cordoned off, and efforts were made to establish cattle-free belts. Inoculation was resorted to where the disease was not spreading rapidly, and was carried out in over 26,000 head of cattle.

The system of intensive supervision, begun in 1946, to control African Coast fever, was seriously handicapped by transport difficulties and staff resignations. Dipping and hand-dressing had to be carried out at seven-day intervals between June and December, and on one farm—owing to the malnutrition of the cattle—at 14-day intervals. On five infected farms the owners had taken no interest in their cattle at all, leaving all the work to special native constables.

Gammexane dips were tried in several tanks in the Colony during the year, but it was too early yet to make any statement on their effectiveness. Experience indicated, however, that (1) the fluid had to be replenished in the tank much more frequently than was recommended by the various manufacturers; (2) the dip did not appear effective against the moulting larval and nymphal stages of *Rhipicephalus evertsi*, nor in some cases against the moulting stages of the adult blue tick; (3) it was most effective when used in conjunction with arsenic, and specially against blue ticks; (4) used by itself, three-day dipping could be safely carried out—an advantage over arsenical dips; (5) it was difficult to regulate the strength of fluid in the tank; (6) on farms where this dip was used, a marked reduction in the fly population was noted; (7) it was particularly efficient in killing lice and mange parasites, and (8) on several farms where it was used, a reduction in cases of ophthalmia and screw-worm was observed, due no doubt to the decrease in fly population.

Tuberculosis was stated to be on the increase; contagious abortion remained about the same.

There were 13 outbreaks of anthrax, but prompt action kept the mortality low. The incidence of piroplasmosis and anaplasmosis appeared to be increasing, and on one ranch the two diseases caused 100 deaths in a herd of 300. Phenanthridinium (1553) was used successfully in 34 cases of trypanosomiasis.

(Concluded at foot of next column.)

NOTES AND NEWS

Diary of Events

Oct. 27th.—Meeting of Council, N.V.M.A., at the Connaught Rooms, Great Queen Street, Kingsway, London, 11 a.m.

Oct. 28th and 29th.—N.V.M.A. Conference on "Grassland and Animal Health," at the Wellcome Foundation, 183, Euston Road, London, N.W.1.

Oct. 28th.—Meeting of the Lincolnshire and District Division, N.V.M.A., at Lincoln (Saracen's Head Hotel), 2.15 p.m.

Oct. 29th.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 2.30 p.m.

Nov 4th.—Meeting of the Sussex Division, N.V.M.A., at Haywards Heath (Cattle Market), 2.15 p.m.

Nov. 10th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, London, W.C.1, 2.30 p.m.

Nov. 13th.—Annual Meeting of the Society of Women Veterinary Surgeons, at the Conway Hall, Red Lion Square, London, W.C.1, 2 p.m.

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PERSONAL

Birth.—Johnston.—On October 12th, 1948, to Rosemary (*née* Spencer), wife of Adam Johnston, M.R.C.V.S., 8, Denmark Terrace, Shrewsbury Road, Shifnal—a brother for Neale.

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Marriages.—Archer—Morton.—On October 2nd, 1948, at St. John's, Lewes, very quietly, Richard Kendray Archer, M.A., M.R.C.V.S., to Mary Tavy Morton, B.SC., D.I.C.

Melrose—Kidd.—On October 2nd, 1948, at St. Luke's Church, Thornaby-on-Tees, David Richard Melrose, B.SC., M.R.C.V.S., son of Mr. and Mrs. G. Melrose, Viewfield House, Coldstream, Berwickshire, to Charlotte Wishart Kidd, S.R.N., daughter of the late Mr. F. Kidd and of Mrs. Kidd, 8, Derby Terrace, Thornaby-on-Tees, Yorkshire

. . . . . .

Dr. H. H. Green's Bereavement.—The deep sympathy of his many friends in the profession will be extended to Dr. H. H. Green in the tragic loss he has sustained in the death of his wife, who was knocked down in a motor accident in London and succumbed to her injuries on October 13th. Dr. Green is Head of the Biochemistry Department of the Laboratories of the Ministry of Agriculture at Weybridge and was the founder, under Sir Arnold Theiler, of the Biochemical Department at Onderstepoort, South Africa. Katherine Laura Green was a graduate of Glasgow University and held a teaching appointment in London.

. . . . . .

Mr. G. L. McClymont, B.V.SC., Veterinary Research Officer at the Veterinary Research Station, Glenfield, N.S.W., and who has been in this country accompanied by his wife for some months, is taking the research tripos of the University of Cambridge. The work is being undertaken at the Institute of Animal Pathology under the direction of Professor W. I. B. Beveridge.

* * * * *

The Late Thomas Eaton Jones, F.R.C.V.S.

Mr. Eaton Jones, of Red Cot, Beach Lawn, Waterloo, Liverpool, formerly Chief Veterinary Officer to the Corporation of Liverpool, whose death at the age of 76 years we announced with deep regret in our last issue, came from an old-established Shropshire Yeoman family.

After serving a pupilage with Mr. Stafford Jackson, of Liverpool, he qualified from the Royal Veterinary College, Camden Town, in 1894. He took his Fellowship in 1911.

Immediately after graduation, he took up the position of Assistant to his mentor, Mr. Jackson, which he held for about two years. At this time Liverpool Corporation were alone in employing a whole-time veterinary surgeon—Mr. R. S. Reynolds—who was a notable figure of the period and intimately and prominently connected with the early history of the Shire Horse Society. Mr. Eaton Jones succeeded Mr. Reynolds as Chief Veterinary Officer and held the position for 35 years.

During this period the Department in his charge was developed considerably, being concerned not only in the management of an extensive and notable stud of working horses but also an increasing amount of work arising from a progressive Public Health policy undertaken by the Department. The management of the stud and its many and varied successes at shows of national importance was a matter for which he could feel justly proud.

Mr. Eaton Jones was closely connected with the foundation of the Veterinary School of Liverpool University and for many years was an active and most acceptable member of its teaching staff. He was also one of the prime movers in the institution of the Diploma of Veterinary Hygiene of the University, one of the earliest post-graduate courses dealing with Public Health work. He made many communications on Public Health matters and horse management, and took part for some time in the activities of the Royal Sanitary Institute.

For many years Mr. Eaton Jones was Consulting Veterinary Surgeon to the Royal Lancashire Agricultural Society and for his long and devoted service he was made an Honorary Life President—a rarely bestowed honour. He was Secretary for nearly 50 years of the Liverpool May Day Parade, always a striking and notable spectacle with a large appeal. Whilst acting as Chief Veterinary Surgeon to the Shire Horse Society he organised weight-pulling demonstrations; the one staged at the Annual Show at the Agricultural Hall, Islington, was notable for the fact that one horse actually started in motion a load of 18½ tons, the performance being of great interest to King George V, who was present. Subsequently, at a demonstration at Wembley Exhibition, a pair of horses pulled over 20 tons against a dynamometer.

He was Veterinary Surgeon to Aintree Racecourse for a long period and was always glad to relate that he had not missed a Grand National for 53 years. A man of many activities in many spheres, he was interested in varied aspects of sport—shooting, racing, fishing, bowling and golf: he was a former captain of the West Derby Golf Club. A keen bridge player, on one occasion won the Northern Championship. One of his interests was Freemasonry, he being Past Worshipful Master Fleetwood Lodge.

Mr. Eaton Jones was a Past-President of the Lancashire Veterinary Association. He held for some time a commission in the Duke of Lancaster's Yeomanry and attended a Levee at Buckingham Palace in May, 1903, being presented to King Edward VII by the Rt. Hon. the Earl of Ellesmere.

His services were in great demand as a judge of horses and in that capacity he acted on several occasions at the International Horse Show, Olympia. It has been said that the "Golden age of the horse" was liberally studded with notable fignures and Eaton Jones can with full justice be included in that category.

Eaton Jones quickly formed decided views which he was always prepared to hold and defend with resolution. A man of great personal charm, he was ever true and loyal in his friendships.

Mr. Eaton Jones was laid to rest in Thornton Cemetery on Friday, October 8th. The flags in Liverpool on all public buildings were flown at half mast in tribute to his memory.

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The Animal Health Trust

On Wednesday last the President (the Duke of Norfolk) and Trustees of the Animal Health Trust entertained to luncheon at the Café Royal, W.1, a number of leading agriculturists and those connected with the thoroughbred horse breeding industry and the breeding of dogs and poultry. As last year, the luncheon was held in association with the Annual General Meeting, at which was presented the second annual report, covering the period September 1st, 1947 to June 30th, 1948. The report, which will be reviewed fully in our columns shortly, reveals the gradual development of most of the objects originally designed by the Trust.

At the luncheon, an extended report of which also will appear in an early issue, the speakers were the President, with Mr. Jim Turner, President of the National Farmers' Union, and Dr. W. R. Wooldridge, the Scientific Director of the Trust.

In his speech, the Duke of Norfolk expressed regret that the great majority of people do not realise the urgent call which exists for effective action to be taken to raise the standards of health of all animals, farm and domesticated.

Internal parasites continued to take a heavy toll, especially in districts where the farmers would not apply regular preventive measures. Of 61,748 cattle slaughtered at Salisbury, 30,413 livers were condemned because of fluke infestation.

The total number of animals slaughtered at the four abattoirs under the control of the Veterinary Department was 249,431. Attention was drawn to the number of cattle condemned for emaciation as compared with disease. In Salisbury the proportion was 2,181 to 379, in Bulawayo 941 to 277, and represented a preventable loss of beef amounting to 900,000 lb.

Figures of what some of the principal diseases of farm livestock were costing the nation were so staggering that six years ago leading veterinarians and representatives of livestock interests got together and established what is now known as the Animal Health Trust, designed to stimulate the educational training and research work essential to scientific progress in the veterinary field.

The Duke said he was quite certain that during the intervening years not a scrap of evidence had been forthcoming to suggest that losses from animal diseases had declined. In fact, thanks to the increase in price levels the pre-war total monetary loss had virtually been doubled and must now be assessed at £60 millions at least.

He appealed to the farming and allied industries to make the cause of Animal Health their own and to do so in the sure knowledge that the money spent in supporting the educational and research activities of the Animal Health Trust would be repaid handsomely by higher health standards of their livestock, by increased volume of production of meat and livestock products, by raising the numbers and quality of stock available for export market, and by enhancing the productivity of their soil.

The Animal Health Trust aimed at lifting the standards and attainments of veterinary research workers and specialists and also aimed to create in their research stations an atmosphere which would attract workers of the highest calibre.

The Trust's income had to be raised by £150,000 annually over its present figure so that the work of its farm livestock stations could go ahead. It was a very small sum in comparison with the scores of millions of pounds which livestock farmers lost every year through the incidence of disease in their flocks and herds. The Trust enjoyed the cordial support of the Royal Agricultural Society, the National Farmers' Union, the Milk Marketing Board and others, as well as the endorsement of the Ministry of Agriculture and the Agricultural Research Council.

What was wanted was organised action by those interested in cattle, sheep and pigs, identifying themselves with the activities of the research stations which were to be opened as speedily as possible to deal with the problems of those animals.

Through self-help, they could drastically reduce the enormous cost of disease to the livestock industry. By doing so they would make a great contribution to the nation's economic recovery and to improving the dietary of every household in the land.

Dr. W. R. Wooldridge said that even when it was widely appreciated that every country must increase its food production, the losses arising from disease among farm livestock in Britain were not fully appreciated.

In Britain, the annual food loss amounted to 200,000,000 gallons of milk, 6,000,000 full-year rations of meat, 2,000 tons of liver and other offal, 38,000 tons of poultry meat, and 1,500,000,000 eggs.

Should not Britain tackle this problem of animal disease at all levels? That could only be accomplished by providing means for improving skilled veterinary personnel, establishing research centres for tackling the troubles afflicting all animals, creating reasonable clinical and specialist services, in short by doing all the things for which the Animal Health Trust stood.

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"NEW ATTACK ON SHECHITA"

"'Savage Method' of Slaughter"

In its issue of October 8th, the *Jewish Chronicle*, under the above headings, prints the following report from its own representative at the meeting concerned:—

A petition to the House of Commons pleading, among other things, for the prohibition of the Jewish method of slaughtering animals, was launched by the North Herts Committee for Slaughter Reform, following a public meeting which was addressed by Air Chief Marshal Lord Dowding and Sir Thomas Moore, M.P., at the St. Francis Theatre, Letchworth, on Wednesday evening of last week.

Written propaganda attacking the practice of Shechita was distributed to a meeting by the R.S.P.C.A. One pamphlet had highly imaginative illustrations of cattle being slaughtered by a shochet.

The Chairman of the Shechita Committee of the Board of Deputies, Mr. Elsley Zeitlin, attended the meeting and took part in the discussion. The Rev. Dr. J. W. Parkes also attended as an observer on behalf of the Council of Christians and Jews.

There has been considerable propaganda against Shechita in Letchworth since the establishment of the Jewish section in the slaughterhouse during the war.

The petition urges the House of Commons "to turn its immediate attention to the enactment of a suitable Bill to make it illegal for any animal destined for food to be slaughtered before it has been rendered unconscious by a mechanically operated instrument suitable and sufficient for the purpose, and, further, to consider legislation for the suppression of the many other forms of ill-treatment of livestock slaughtered for food, as have been already and repeatedly condemned by the recognised Animal Protection Societies."

Lord Dowding, after complaining that sheep and lambs were not protected by law in regard to the method of their slaughter, and that about half a million animals were being killed each year outside slaughterhouses, said they must make sure they had nothing to reproach themselves with before they reproached other people.

Turning to the question of Jewish and Moslem methods of slaughter, Lord Dowding said that he was not trying to inflame public opinion against the Jews: very much the contrary. He wished this question to be regarded quite dispassionately and on its merits.

The case against the Jewish method was that it caused unnecessary suffering, and that there was no Biblical or Talmudical authority behind it. Even if there were, nations and religions must progress; just because a religion has a certain tenet, it did not mean that it must always adhere to it. The point had very well been put last year by a Rabbi in a series of talks entitled "What I Believe." He had stressed that religious ideas and methods must progress with the times.*

According to calculation, said Lord Dowding, about six or seven times the number of animals required for consumption by the Jews were killed by the Jewish method. The rest were sold to the Christian community. Their objection was that the carrying out of Jewish slaughter parallel with the normal methods in one slaughterhouse prevented proper inspection and enforcement of their own regulations in their slaughterhouses.

Correspondence with Chief Rabbi

Before the opening of their campaign, he had thought it only courteous that he should write to the Chief Rabbi asking him what he had to say on the subject and whether one could expect any co-operation from him in the reform of the slaughter method. He (Lord Dowding) had chosen a rather bad time; for a new man had just been appointed, and it was hardly reasonable to expect that the new headmaster would start altering "important school rules."

He had received a very sympathetic answer from the Chief Rabbi on the question of the Weinberg pen, in which the animal could be turned on its back without any preliminary struggle. He was sure that they could rely upon the Chief Rabbi's help in ensuring that the Weinberg pens were used to the fullest extent. That was not the case at the present time; there were slaughterhouses which had the pens and did not use them.

On the question of the humane killer, Lord Dowding said that he had come up against a completely blank wall. In one of his letters the Chief Rabbi had stated that the Jewish method of slaughter was a fundamental religious rite that was strictly observed by Jewish communities in every part of the world.

The Jews maintained that the animals did not suffer after any preliminary struggle (which all the best Jewish authorities were united in trying to prevent) and that throat-cutting entailed no suffering. That proposition was supported by cohorts of scientists: but he had no hesitation in saying that if he went about with equal assiduity he could produce an equally long list of equally well-known scientists who would say that the animals did suffer. It was too important a matter to rest upon the opinions of professional advisers.

It could be taken without contradiction that animals did suffer as a result of the Jewish method; and the Weinberg pen had been devised very largely as a result of that suffering. A past President of the Jewish Shechita Board had offered prizes for any method that would obviate the suffering of the animal when its throat was being cut.

Switzerland, Norway and Spain had absolutely forbidden the Jewish method. It might be that the Jewish authorities could be brought to realise that the humane killer served all the necessary purposes and was not in any way contrary to religion.

Sir Thomas Moore said it was monstrous that in these modern days they should permit this savage method of killing to continue.

Lord Horder's Investigation

During question time, Mr. Zeitlyn pointed out that there was a list of 450 scientists who had stressed the absolute humaneness of the Jewish method, and Lord Horder had made a careful investigation into the process of Shechita and was satisfied with it.

Lord Dowding said he did not know about the 450 scientists. In the book the Chief Rabbi had sent him there were 12 names. The Duchess of Hamilton had once timed the struggle of an animal, and it was seven minutes before it became passive.

* The Rabbi referred to is Dr. I. I. Mattuck.—Ed., *J.C.*

Mr. H. E. Bywater, Veterinary Officer for West Ham, said that the majority of the Jewish slaughterhouses did not use the Weinberg pen. Lord Horder had probably never been in a slaughterhouse, and if he had seen Jewish slaughter practised throughout the country he would have changed his mind.

A Christian member of the audience referred to the danger of inflicting cruelty on a people. He did not know whether the Jewish race showed in their lives that they were more cruel than the Christians. Any kind of slaughter of animals was cruel.

The Chairman of the North Herts Committee for Slaughter Reform, Mr. B. Donne-Smith, read out the petition and appealed for signatures.

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R.C.V.S. CENTRAL LIBRARY FOR ANIMAL DISEASES

Accessions for Quarter ending August 31st, 1948

PRESENTATIONS

Books

BEVERIDGE, W. I. B.: Veterinary education. An inaugural lecture. (1948). Presented by the author.

BLOUNT, W. P.: Diseases of poultry. (1947). Presented by the author.

FARMING TO-DAY: Broadcasts Vol. 5. (1947). Presented by G. N. Gould, Esq., M.R.C.V.S.

LILLEENGEN, K.: Typing of *salmonella typhimurium* by means of bacteriophage. (1948). Presented by the Bacteriological Department of the Royal Veterinary College, Stockholm.

OBEL, N.: Studies on the Histopathology of acute laminitis. (1948).

ROYAL VETERINARY INSTITUTE. Stockholm. Collected papers. (1947).

STAPLEDON, Sir R. G.: *ed.* Farming and mechanised agriculture. (1948). Presented by G. N. Gould, Esq., M.R.C.V.S.

WRAMBY, G.: Investigations into the antigenic structure of *Bact. coli* isolated from calves. (1948).

Reports, 11 ; *Pamphlets and Reprints*, 24.

PURCHASES

FLUCKINGER, G.: Eidgenössische Tierseuchengesetzgebung im Wandel der letzen 24 Jahre. (Swiss federal animal disease legislation during the past 25 years.) Berne. (1946). 3s. 9d.

FLUCKINGER, G. *and* VON WALDKIRCH, E.: Commentaires à la loi fédérale sur les mesures à prendre pour combattre les epizooties. 2nd ed. Lausanne. (1945). 8s. 4d.

FRANK, E. R.: Veterinary surgery notes. Minneapolis. (1947). 32s. 6d.

FRAUCHIGER, E.: Die Nervenkrankheiten des Rindes. (The nervous diseases of cattle.) Berne. (1941). 30s.

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COLLECTION OF TYPE CULTURES

The Medical Research Council published on October 15th a *List of Species Maintained in the National Collection of Type Cultures*. This list is not intended to be a substitute for the *Catalogue of the National Collection of Type Cultures*, which was last revised in 1936 and is now out of print, but the new edition of the *Catalogue* will take several years to prepare, and meanwhile bacteriologists may wish to know what species are available at the National Collection and how many strains of each species are maintained. The information given in the list is correct to the beginning of June, 1948. This new Memorandum (No. 21) can be obtained from H.M. Stationery Office, price 9d.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

SHEEP SCAB:

Monmouth.—" Ty H'r," Fwthog, Abergavenny, Mon. (Oct. 9th).

Brecon.—Cwm Farm, Cwmden, Crickhowell; Tyleglas, Three Cocks, Brecon (Oct. 11th).

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Erratum.—J. L. Linzell: "Long-continued lactation without pregnancy" (**60.** 511).—The duration of continuous lactation in the Jersey cow recorded by Linton (line 8), should be 15 (fifteen) years and not 18 as printed.

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A record price of £2,200 was paid at Lanark ram sales for a black-faced shearling ram belonging to Mr. David Provan, of Gateside, Douglas, Lanarkshire. It was purchased by a syndicate of three Scottish sheep breeders.

It is announced that pigs and poultry-keepers are to receive a bonus allocation of feeding-stuffs within the next few months. These bonus issues will be made at regular intervals and will be related to the egg supplies delivered at packing stations, and pig meat delivered at bacon factories.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible

INCIDENCE AND CONTROL OF TUBERCULOSIS

Sir,—Further to my letter published in your issue of July 24th, 1948, I have now been able to obtain figures for the total number of herds in Somerset which are tuberculin tested.

The number of attested herds is 647, and of these 542 are also licensed T.T. herds. These are the herds on which the quarterly announcements as to the numbers of tested cattle, and their percentage of total cattle, are made and published in the Veterinary and Agricultural Press. There are also, however, 397 licensed T.T. herds and 69 supervised herds in Somerset. These do not appear in any of the official announcements although they constitute over one-third of the herds which are tuberculin tested, and increase appreciably the number of officially tested cattle (altogether 1,113 herds).

Incidentally, these herds must also increase the administrative work of the Ministry's officials, particularly as licensed T.T. herds are tested every six months. It would be interesting to see comparable figures from other counties.

Yours faithfully,

DENIS NICHOLSON.

The Hollies,
New Street, Wells.
October 15th, 1948.

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ACUTE GRASS DISEASE

Sir,—I read with the greatest interest the article by Messrs. Robertson, Burgess, Inglis and Paver on "Acute Grass Disease" which appeared in *The Veterinary Record* of October 16th.

The essential feature of this disease as pointed out in the Annotation published in the same number of *The Veterinary Record* is dysfunction of the gastro-intestinal tract. "In acute cases some difficulty in swallowing usually occurs. Complete or almost complete bowel stasis is present and auscultation of the abdomen reveals the absence of peristaltic sounds." There is evidence, therefore, of more or less generalised paralysis of the gastro-intestinal tract. I was particularly struck by a concluding paragraph in the article to which reference has been made: "Our results indicate that the fundamental trouble is more or less localised to the gastro-intestinal region. This, taken in conjunction with the known facts about the incidence of the disease, viz., that the great majority of cases occur in horses at grass with the greatest incidence in May and June when grass is in the early stages of growth, suggests rather a local action of some toxic factor directly or indirectly associated with grazing."

At the Conference on "Grassland and Animal Health," Mr. W. S. Ferguson, of the I.C.I. Jealott's Hill Research Station, will be describing work which has been done there in isolating a factor from clover and lucerne which apparently has a paralysing effect on intestinal muscle in cattle and which may, therefore, be associated with the problems of bloat. This disease also shows signs essentially of gastro-intestinal paralysis, and its distribution and incidence follow no regular pattern.

It would seem possible, therefore, that a toxic herbage factor which would account for the symptoms exhibited in acute grass disease, might be present in pasture which appeared normal on botanical survey or to other examination.

Yours faithfully,

D. D. OGILVIE.

"Corbiere,"
36, King's Road,
Sale, Cheshire.
October 18th, 1948.

ADVERTISER'S ANNOUNCEMENT

Burroughs Wellcome & Co. announce the following price alterations, effective from October 1st:—

'Wellcome' brand Lamb Dysentery Serum 100 c.c.—22s. 6d. (subject to professional discount).

'Wellcome' brand Pulpy Kidney Serum 100 c.c —22s 6d. (subject).

'Wellcome' brand Flutter Valve Injection Apparatus—11s. (net).